Quasi-Experimental Impacts of Family Self-Sufficiency Programs Administered by Compass Working Capital in Partnership with Housing Agencies in Cambridge, Boston, and Lynn, MA

August 2021

Final

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Acknowledgements

This work is supported by JPMorgan Chase & Co. through a research contract with Compass Working Capital, Inc. The views and opinions expressed in the report are those of the authors and do not necessarily reflect the views and opinions of JPMorgan Chase & Co. or its affiliates.

In addition to the support from JPMorgan Chase & Co., we gratefully acknowledge the support and assistance of the following organizations and individuals: the U.S. Department of Housing and Urban Development's Office of Policy Development and Research provided the administrative data used in this analysis through a Data License Agreement. In addition to sharing funding for this evaluation, Compass Working Capital, Inc. provided essential program data, support in obtaining data from other sources, and program-related guidance. Alex Silverman conducted data processing and analysis to support this work.

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Executive Summary

This report documents our findings of higher earned income and lower public benefits due to participation in Family Self-Sufficiency (FSS) programs administered by Compass Working Capital (Compass) in partnership with three public housing agencies. Compass is a national nonprofit financial services organization, headquartered in Boston and Philadelphia, that works with public housing agencies and private owners to administer FSS programs for households participating in U.S. Department of Housing and Urban Development (HUD) rental assistance programs.

What did we study?

FSS is a HUD program established by Congress in 1990 that seeks to help participants in three HUD rental assistance programs (the Housing Choice Voucher, Public Housing, and Project-based Section 8 programs) make progress toward economic security. FSS works to achieve these goals by combining stable affordable rental housing with: (a) case management, service coordination, and/or financial coaching to help participants identify and achieve their goals and (b) an escrow savings account that increases in value as participants' earnings and rent contributions rise. Under the FSS program, participants receive the full accumulated amount saved for them in the escrow account if and when they graduate the FSS program; they also may access funds on an interim basis when needed to make progress toward their goals.

Compass' implementation of FSS focuses on helping families to build assets and improve their financial capabilities. In recruiting families, Compass builds on the aspirations that rental assistance participants have for themselves and their families. Using participant-centered coaching, Compass helps families identify and achieve their financial goals. Compass' FSS program work is funded by its partner housing agencies and private owners and grants from foundations and other philanthropic organizations.

Using HUD administrative data, we conducted a quasi-experimental analysis of the impact of Compass FSS on the earnings and public benefits receipt of Housing Choice Voucher holder households in three housing agencies in Eastern Massachusetts: Cambridge Housing Authority (CHA), Metro Housing|Boston (Metro Housing)[1], and Lynn Housing Authority and Neighborhood Development (LHAND).[2] To estimate the impact of the Compass FSS programs, we used quasi-experimental matching methods to compare the earnings and benefits receipt of households participating in Compass FSS programs in Cambridge, Metro Housing, and Lynn with the earnings and benefits receipt of comparable households participating in other HUD rental assistance programs in similar urban settings.

Prior to conducting the impact analysis, we identified two confirmatory findings as most important for assessing the effectiveness of the Compass FSS program.[3] These two confirmatory findings include: the

[1] Metro Housing|Boston is a nonprofit organization that administers state and federal housing assistance in the Boston metropolitan area on behalf of the statewide public housing agency, Massachusetts Department of Housing and Community Development (DHCD).

[2] The three agencies are listed here and throughout the report in order of the size of their FSS programs with Compass, from largest to smallest.

[3] In advance of conducting the impact analysis, we classified each test of the program's impact as either confirmatory or exploratory. The two pre-specified confirmatory findings are those on which we place the greatest weight on as potential indicators that the program met its intended goals. By limiting the number of confirmatory findings, we limit the risk of mistakenly reporting the program as a success (that is, type I error, or "false positives") for these high priority findings.

short-term and long-term impact of Compass FSS on annual earned income of the combined sample of the three Public Housing Agencies (PHAs). As noted in the box below, the study found statistically significant positive impacts on both of these confirmatory outcomes, as well as a range of other statistically significant impacts.

What did we find?

We found that the Compass FSS participant group performed substantially better than the comparison group in earnings growth and reductions in public assistance income.

Impacts on Earnings

- **Short-Term Earnings**. In the combined sample of the three PHAs, Compass FSS participants had annual household earnings that were ***$4,997 (21%) higher*** (on average) than the earnings of the comparison group 1 to 3 years after FSS enrollment. This reflects annual household earnings an average of 1.5 years after FSS enrollment.
- **Long-Term Earnings**. In the combined sample of the three PHAs, Compass FSS participants had annual household earnings that were ***$6,032 (23%) higher*** (on average) than the earnings of the comparison group as measured by the most recent income certification that was no more than 5 years after FSS enrollment. This reflects annual household earnings an average of 3.2 years after FSS enrollment.
- **Individual PHA Results.** In the Cambridge and Metro Housing samples, Compass FSS participants had annual household earnings that were higher than the earnings of a comparison group in both the short-term and long-term. In the smaller Lynn sample, we detected a statistically significant positive impact on annual household earnings only in the short-term.

Impacts on Receipt of Public Benefits

- **Public Assistance Income**. Compass FSS participants had annual public assistance income that was ***$249 (39%) lower*** (on average) than that of the comparison group as measured by the most recent income certification that was no more than 5 years after FSS enrollment. Note that Massachusetts has time limits on receipt of Temporary Assistance for Needy Families (TANF), which complicates interpretation of this result.
- **SSI, Social Security, and Pension Income**. Compass FSS participants had annual SSI, Social Security, and pension income that was ***$565 (19%) lower*** (on average) than that of the comparison group as measured by the most recent income certification that was no more than 5 years after FSS enrollment.

NOTES: Short- and long- term earnings for the full sample are confirmatory outcomes. PHA-level earnings and public benefits are exploratory outcomes. Public Assistance Income includes TANF assistance, together with other general direct government assistance, and PHA-imputed TANF or direct assistance income. Percent differences between Compass FSS participant and comparison household outcomes are calculated by dividing the average impact by the average comparison household outcome.

These findings suggest that the FSS program that Compass administers in partnership with the three housing agencies is effective in supporting earnings growth and reductions in public benefits. The findings are consistent with findings from an earlier quasi-experimental evaluation of impacts of the Compass FSS programs in Lynn and Cambridge that Abt conducted and reported in Geyer et al. (2017). In comparison to that study, this study reports on the impacts of Compass FSS for a larger sample and a longer timeframe, and it includes a third agency, Metro Housing. As described in the main body of the report, this study measures impacts on earnings and public benefits receipt somewhat differently from the prior study, including outcomes measured at both short- and long-term follow-up time periods. This study also includes exploratory findings for individual PHAs.

1. Introduction

This report documents the findings from our quasi-experimental evaluation of the impacts of the Family Self-Sufficiency (FSS) programs administered by Compass Working Capital (Compass) in Lynn, Cambridge, and Boston, Massachusetts in partnership with the Lynn Housing Authority and Neighborhood Development (LHAND), the Cambridge Housing Authority (CHA), and Metro Housing|Boston (Metro Housing), an affiliate of the Massachusetts Department of Housing and Community Development.[4] Compass, a national nonprofit financial services organization headquartered in Boston and Philadelphia, works with public housing agencies (PHAs) and private owners to administer FSS programs for households participating in HUD rental assistance programs. Compass also hosts the Compass FSS Link platform (https://www.compassfsslink.org/) that helps other agencies across the country learn from Compass and each other to strengthen their FSS programs.

FSS is a program of the U.S. Department of Housing and Urban Development (HUD) designed to help housing assistance recipients increase their earnings and build savings to make progress toward economic security. The standard FSS program has three main components: (1) stable affordable rental housing; (2) case management, service coordination and/or coaching to help families set and achieve their goals; and (3) an escrow account that increases in value as participants' earnings and rent contributions increase.

To assess the impact of the Compass' FSS programs on participants' earnings and public benefits receipt we conducted a quasi-experimental impact analysis that compares the change in household earnings and cash benefit amounts of Compass FSS participants with a matched comparison group. Since all of the Compass FSS participants in our analysis have Housing Choice Vouchers, we selected comparison group households by matching Compass FSS participants with voucher holders in other Massachusetts, Connecticut, and Rhode Island PHAs during the same period.

Compass' FSS Partnerships

Compass began administering the Lynn FSS program in partnership with LHAND in October 2010 and extending through the end of 2018. Compass began administering FSS programs in partnership with CHA and Metro Housing in 2012 and 2014, respectively. Our study of earnings and public benefits receipt focuses on the experience of 564 households with housing vouchers who enrolled in one of these three FSS programs while they were administered by Compass.

Like traditional FSS programs, the Compass FSS programs provide clients receiving housing assistance with two main program services: The first is the opportunity to build savings in an escrow account tied to increased rent paid as a result of increased earnings following enrollment in the program. Participants receive the full balance of these escrowed savings, with no strings attached, if and when they complete the FSS program; they also have the opportunity to receive interim disbursements of escrowed funds if needed to make progress toward their individual goals. The second is one-on-one coaching to encourage

[4] For ease of reference, we refer to the three programs collectively as "Compass FSS programs" and the participating households as "Compass FSS households." However, while Compass is responsible for providing coaching services to families in all three programs, both Compass and their partner agencies play essential roles in the programs' operations. In this sense, they are true public-private partnerships.

and support participants in increasing their earnings and achieving other individually identified goals.[5] Families join the programs voluntarily and must continue to meet with their FSS financial coach periodically to remain in the FSS program. A family's participation in FSS (or withdrawal or graduation from FSS) has no impact on the family's level of housing assistance. To graduate from the FSS program (and receive the full amount accrued in escrow savings), participants must be employed, all household members must have been free of TANF assistance for at least one year, and participants must have achieved the participant-specific goals outlined in their individual training and services plans.[6]

In addition to the traditional FSS program requirements and components, Compass' implementation of FSS includes several innovative features, including:

- A strong focus on helping clients build financial capability, pay down high-interest debt, build savings, and improve their budgeting and credit scores, complementing the asset-building that occurs through the FSS escrow accounts;
- A coaching model that emphasizes participant-driven interaction and goal-setting;
- A program-wide approach to marketing and outreach that includes a postcard marketing campaign that builds upon families' aspirations for themselves and their children; and,
- A public-private partnership model, supported by philanthropy in addition to funds from partner agencies and HUD.[7]

While the FSS programs in Lynn used the standard calculation of FSS escrow, the FSS program in CHA during the study timeframe provided only half of the traditional escrow amounts for households with incomes below 50 percent of the area median income (AMI). At the same time, the Cambridge escrow model eliminated the standard cap on escrow accumulation for households with incomes between 50 and 80 percent of AMI.[8] Metro Housing's FSS escrow rules also differ somewhat from the standard formula. Metro Housing has instituted a $25,000 lifetime cap on escrow accumulation and disbursement and, similarly to CHA, has eliminated the cap on escrow accumulation for households between 50 and 80 percent of AMI. While our study is not large enough to allow for a comparison of earnings impacts across each of the three individual FSS programs, we were able to estimate the impact of FSS on earnings within each of the three agencies.

What We Know from Existing Research

Despite FSS' 28-year history, there have been relatively few rigorous evaluations of its effects. To our knowledge, this is only the fourth evaluation of a local FSS program to compare earnings outcomes for

[5] All FSS programs provide case management or coaching to help participants identify goals and overcome barriers to achieving them. The form of this interaction can vary substantially, however, from one local program to another.

[6] HUD is expected to implement new regulations by the end of 2021 that will change some graduation requirements going forward.

[7] While most FSS programs are run entirely by PHAs, the Compass FSS programs are run by Compass (i.e., a nonprofit that specializes in financial coaching and asset-building programs) in partnership with the public housing agencies

[8] The agency has been able to make these changes because it participates in the Moving to Work (MTW) demonstration program.

FSS participants to those of a matched comparison group.[9] It is also the second evaluation of a full FSS program to find statistically significant differences between the economic progress of FSS participants and an applicable comparison group. The other one was Abt's earlier study of FSS programs that Compass administers in partnership with housing agencies in Cambridge and Lynn, which covered a shorter time period than the current evaluation and did not include Metro Housing (Geyer et al. 2017). Geyer et al. found substantial impacts in increasing participant earnings and decreasing public assistance benefits. There has not previously been any evaluation with a comparison group of whether the FSS program is effective in a program with a reduced escrow contribution formula, as seen in Cambridge.

HUD has contracted with researcher MDRC to conduct a randomized controlled trial of a convenience sample of mostly large FSS programs. To date, the study has not detected any impact of FSS on earned income or employment, though the evaluation is ongoing with final results expected in 2022 (Verma et al 2019).

Two national studies commissioned by HUD described earnings gains for FSS participants but did not include data for comparison groups (Ficke and Piesse 2004; De Silva et al. 2011).

See Geyer et al. (2017) for a discussion of research on the effects of housing vouchers on earned income.

This Report

In the sections that follow, we provide information on our methodology for the analysis, followed by a presentation and discussion of confirmatory and exploratory outcomes. Additional methodological detail is available in the appendix.

[9] The other three are: (a) a randomized controlled trial of the Work Rewards pilot in New York City that tested FSS along with conditional cash transfers (Verma et al. 2017); (b) A quasi-experimental study of a Denver program focused on a limited population of intensively treated individuals enrolled in a special homeownership program in addition to either FSS or Denver's Resident Opportunities and Self-Sufficiency program (Santiago, Galster, and Smith 2017); and (c) Abt's prior study of the FSS programs Compass administered in partnership with housing agencies in Cambridge and Lynn, MA (Geyer et al. 2017). In addition, Anthony (2005) used regression techniques to study outcomes for FSS participants in Rockford, Illinois,

2. Data and Methods

To estimate the impact of the Compass FSS programs, we used quasi-experimental matching methods to compare the earnings and benefits receipt of households participating in Compass FSS programs in Cambridge, Metro Housing, and Lynn with the earnings and benefits receipt of comparable households participating in other HUD rental assistance programs in similar urban settings.

The treatment group sample includes Compass FSS participants who received rental assistance in Cambridge, Boston, and Lynn who enrolled in FSS at any point between the start of the Compass FSS programs in the three housing authorities (October 2010 in LHAND, November 2012 in CHA, and June 2014 in Metro Housing) through October 2018.[10] Our combined treatment group sample includes a total of 564 households: 230 from Cambridge, 191 from Metro Housing, and 143 from Lynn.

Since the characteristics of households that enroll in the voluntary FSS program may differ from that of households that do not enroll, the voucher-holder households in Cambridge, Metro Housing, and Lynn who did not enroll in a Compass FSS program are not a suitable group for comparison. Instead, the comparison group should comprise households in other PHAs who are most similar to those who chose to enroll in a Compass FSS program. Ideally, such a comparison group would be created through random assignment of households that have expressed a willingness to participate in FSS. That approach was not available to us. Instead, we use a quasi-experimental design, selecting a comparison group that is comparable to the Compass FSS participants with respect to (1) local labor market opportunities and (2) the baseline characteristics of households, including demographic and income sources.

This section describes the data and methods used for this analysis, including data sources, how we selected the PHAs from which to pull comparison group sample, how we selected comparison group members, and the methods used to estimate program impacts. More detail on the methodology for selecting comparison PHAs and comparison households is provided in Appendix A.

Data Sources

The quasi-experimental impact analysis uses data from HUD's PIC data systems (including administrative data submitted by PHAs as part of Form HUD-50058) that was provided to the study team by HUD. We used data that includes all households receiving Housing Choice Vouchers in all PHAs in Massachusetts, Rhode Island, and Connecticut that had a HUD-50058 record between July 1, 2007 and March 1, 2020.

The PIC data we used for the analysis have a number of limitations. They do not offer information about households prior to their participation in the voucher program, nor do they follow households if they leave the voucher program. We also do not have data explaining why they entered or exited the HCV program. We include within each of our analyses all Compass FSS households that have both a baseline annual recertification that captures earnings and public benefits receipt prior to FSS enrollment and a follow-up annual recertification that captures earnings and public benefits receipt 1 to 3 years after FSS enrollment. Starting with a sample of 792 potential treatment group households, 228 were dropped due to missing baseline or follow-up data, resulting in a final analytic sample of 564 treatment group households. Households with missing data could include Compass FSS households that graduated from

[10] Compass administered LHAND's FSS program from October 2010 through the end of December 2018. Compass has administered the FSS program for CHA since November 2012, Metro Housing since June 2014.

the FSS program with escrow and left the voucher program as well as any FSS household that left the voucher program without graduating from FSS.[11]

Selecting Comparison PHAs

Before selecting comparison households, we first selected comparison PHAs from those in Massachusetts, Connecticut, and Rhode Island where less than 5 percent of households with non-elderly heads who did not have a disability participated in FSS. For each of Metro Housing, CHA, and LHAND, we identified comparison PHAs where voucher-holders lived in similar census tracts to their corresponding treatment PHAs. Following methodology used in the original Compass FSS evaluation by Geyer and colleagues (2017), we used standardized census tract characteristics, such as employment rate and racial composition, we generated a "distance" metric that allows us to compare the typical census tract of a voucher holder in one housing authority to the typical census tract of a voucher holder in another housing authority. The distance metric allows us to compare housing authorities on several dimensions at the same time.[12] We selected the 20 most comparable PHAs separately for Metro Housing, Cambridge, and Lynn.

Geographic selection is important, because the employment opportunities and employment support opportunities such as public transportation and childcare options vary across cities. While it is impossible to fully control for the impact of place (e.g., local neighborhood amenities, local housing market, and regional job market) on Compass FSS participants, our approach at least ensures that the voucher holders included in the comparison sample live in census tracts comparable to those occupied by voucher holders in Metro Housing, Cambridge, and Lynn along observable dimensions.

Selecting Comparison Group Households

Our analysis examines what effect the Compass FSS program has on households who decide to participate in a Compass FSS program. To address this question, we require a process for selecting comparison group households who would sign up for Compass FSS if it were available to them and apart from living in non-treatment PHAs are otherwise similar to treatment group households. While treatment group households in our analytic sample enrolled in FSS as early as October 2010 and as late as October 2018, a challenge with identifying comparison group households is that we do not observe when comparison group households would have enrolled in FSS if it were offered to them. To address this issue, we use a strategy called "rolling entry matching", which involves creating a "quasi-panel matching dataset" (Witman et al. 2019) containing one observation per treatment group household and multiple observations for each potential comparison group household, one for each time their baseline characteristics are observed through an annual income recertification. This helps ensure that a match can be found for each treatment group household from the set of the potential comparison households who have a recertification within the same quarter as the treatment household's baseline recertification (i.e., the annual recertification immediately prior to or simultaneous with FSS enrollment). After constructing

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[11] Additionally, annual recertifications were occasionally missing from the PIC database for unknown reasons. For instance, annual recertifications were not always observed on an annual basis and baseline annual recertification data was sometimes missing.

[12] We standardize each measure for each PHA by subtracting the full sample mean and dividing by the full sample standard deviation. To construct the distance metric for Metro Housing, we compute the squared difference in each measure between Metro Housing and each potential comparison PHA. We determine each potential comparison PHAs distance from Metro Housing by summing together the squared difference across all measures. This provides an estimate of how "close" each PHA is to Metro Housing. We determine which PHAs are the best comparison for Metro Housing based on which have the lowest distance metric score. Similar steps were conducted for Cambridge and Lynn.

the quasi-panel matching dataset, we conducted a number of sample restrictions to arrive at the dataset we use for matching.[13]

We next determined which baseline characteristics to use for matching using the Least Absolute Shrinkage and Selection Operator (LASSO) approach (Hastie, Tibshirani, and Wainwright 2015), including regressions: (1) to estimate the relationship between treatment households' baseline characteristics and participation in the Compass FSS program; and (2) to estimate the relationship between potential comparison group households' baseline characteristics and future earnings. Baseline characteristics that were selected by either of these two models are used to match treatment group households to comparison group households. We conducted nearest neighbor matching based on the Mahalanobis distance, matching each treatment group household to 3 comparison group household observations with replacement. We required comparison group households to have their baseline annual recertification in the same quarter as the treatment group household to which they are being matched. (For treatment group households, the recertification immediately prior to or simultaneous with enrollment in FSS is considered the baseline annual recertification).

Exhibit 2-1 demonstrates that comparison households selected through this approach were very similar, on average, to the FSS participants in the study, based on their characteristics at baseline. The exhibit presents means and standard deviations for baseline measures of the outcomes of interest separately for treatment households and matched comparison group households. The final column of Exhibit 2-1 labeled "Baseline Balance Effect Size" reports the baseline difference between treatment and matched comparison group households expressed in standardized effect size units calculated using Hedges' *g*. The baseline effect size difference between treatment and matched comparison group households is less than 0.25 for every baseline measure (0.25 is the effect size difference threshold for meeting WWC standards specified by the IES's What Works Clearinghouse). The effect size difference for baseline earnings (a baseline measure of the study's confirmatory outcomes) is 0.02.[14] This is well below the 0.25 cutoff.

Exhibit 2-1. Baseline Equivalence of Compass FSS Households and Matched Comparison Group Households

Baseline Measure	Compass FSS Mean	Compass FSS Standard Deviation	Matched Comparison Mean	Matched Comparison Standard Deviation	Baseline Balance Effect Size
Earnings	$23,834	$19,261	$23,451	$18,653	0.020
Public Assistance	$716	$2,233	$872	$1,922	-0.071
SSI, Social Security, and Pension Income	$2,196	$5,529	$1,991	$4,570	0.039
Other Income	$2,485	$5,596	$2,117	$4,630	0.070

[13] Namely, we dropped comparison group households that were not located in one of the PHAs determined to be most comparable to Cambridge, Metro Housing, or Lynn. We dropped comparison group households that participated in FSS (see note 14 for a sensitivity analysis examining the effect of this exclusion). We dropped treatment group households that did not have an annual recertification in the two-year window prior to FSS enrollment. We dropped treatment and comparison group households if we do not observe a post-baseline annual recertification that could be used to construct outcome data (more details on the construction of outcome data can be found below).

[14] We considered multiple distance metrics to select comparison households. Baseline balance was better when we matched treatment and comparison group households using Mahalanobis distance than it was when using alternative distance metrics, including Euclidean distance and inverse variance. We therefore selected comparison group households based on their Mahalanobis distance, as this metric selected comparison group households that were most similar to treatment group households based on key baseline measures.

NOTES: All reported dollar values are inflation-adjusted to 2020 dollars. The sample includes 564 Compass FSS households and their matched comparisons that are used to estimate impacts on outcomes measured 1 to 3 years after FSS enrollment and outcomes measured most recently. The Baseline Balance Effect Size is calculated using Hedges' *g*. Public Assistance income includes TANF assistance, together with other general direct government assistance, and PHA-imputed TANF or direct assistance income. Other Income includes child support, medical reimbursement, Indian trusts receipt, Unemployment Insurance benefits, and income from other nonwage sources.

Impact Analysis

Our impact analysis compares the earnings and public benefits receipt of Compass FSS households to that of matched comparison group households at the time of recertifications that take place within two time windows. We constructed several outcome measures that describe household earnings and benefits receipt based on HUD's PIC dataset from Form HUD-50058.

We pre-specified two confirmatory findings as most important to assessing the effectiveness of Compass FSS:

- ***Annual household earnings 1 to 3 years after FSS enrollment for the combined sample of all three PHAs.*** Annual earnings as measured by the first income certification observed 1 to 3 years after FSS enrollment.[15]
- ***Most recent annual household earnings for the combined sample of all three PHAs.*** Annual earnings as measured by the most recent income certification that was no more than 5 years after FSS enrollment.[16]

Additional exploratory outcomes included in the main text of the report include the measures noted above for each individual PHA as well as the following outcomes for both the combined sample and each individual PHA:

What's included in key outcomes?

- **Annual Household Earnings** include the sum of all household members' annual earnings reported to the PHA at a given annual recertification.
- **Public Assistance** income includes TANF assistance, together with other general direct government assistance, and PHA-imputed TANF or direct assistance income.
- **SSI, Social Security, and Pension** income includes Supplemental Security Income (SSI), Social Security, and Pensions income as reported by the PHA.
- **Other Income** includes child support, medical reimbursement, Indian trusts receipt, Unemployment Insurance benefits, and income from other nonwage sources.

[15] In practice, for outcomes measured *1 to 3 years after FSS enrollment*, treatment group outcomes are constructed using data from the first income certification that occurs 11 months to 37 months after FSS enrollment and comparison group outcomes are constructed using data from the income certification that occurs closest in time to the income recertification used to construct the outcome for their treatment group match within the 11- to 37-month window. We include certifications as early as 11 months after FSS enrollment and as late as 37 months after FSS enrollment to ensure that we are considering all recertifications that occur in the 1-to-3 year window, even if the specific day of the recertification within the calendar month was different in the baseline recertification relative to the follow-up recertification.

[16] For most recent outcomes, treatment group outcomes are constructed using data from the most recent income certification that occurs 11 months to 61 months after FSS enrollment and comparison group outcomes are constructed using data from the income certification that occurs closest in time to the income recertification used to construct the outcome for their treatment group match within the 11- to 61-month window. We include certifications as early as 11 months after FSS enrollment and as late as 61 months after FSS enrollment to ensure that we are considering all recertifications that occur in the 1-to-5-year window, even if the specific day

- ***Public assistance receipt 1 to 3 years after FSS enrollment.*** Annual public assistance as measured by the first income certification observed 1 to 3 years after FSS enrollment. Public Assistance income includes TANF assistance, together with other general direct government assistance and PHA-imputed TANF or direct assistance income.
- ***Most recent public assistance.*** Annual public assistance as measured by the most recent income certification that was no more than 5 years after FSS enrollment.
- ***SSI, Social Security, and pension income 1 to 3 years after FSS enrollment.*** Annual SSI, Social Security, and pension income as measured by the first income certification observed 1 to 3 years after FSS enrollment.
- ***Most recent SSI, Social Security, and pension income.*** Annual SSI, Social Security, and pension income as measured by the most recent income certification that was no more than 5 years after FSS enrollment.
- ***Other income 1 to 3 years after FSS enrollment.*** Annual other income as measured by the first income certification observed 1 to 3 years after FSS enrollment. The "other income" category, as defined by HUD on Form 50058 for households receiving rental subsidies, includes child support, medical reimbursement, Indian trusts receipt, Unemployment Insurance benefits, and income from other nonwage sources.
- ***Most recent other income.*** Annual other income as measured by the most recent income certification that was no more than 5 years after FSS enrollment.

We constructed two versions of each outcome variable: the outcome measured **1 to 3 years** after FSS enrollment and the **most recent** measure of the outcome that was no more than 5 years after FSS enrollment. Outcomes measured 1 to 3 years after FSS enrollment reflect outcomes an average of 1.5 years after FSS enrollment for the combined sample and enable us to capture short-term impacts of Compass FSS. Most recent outcomes reflect outcomes at an average of 3.2 years after FSS enrollment for the combined sample and enable us to capture long-term impacts of Compass FSS.

We estimated impacts on outcomes of interest for the full sample and separately for each treatment PHA. The impact is computed as the difference in the average outcome for Compass FSS participant households and the average outcome for matched comparison group households. The impact can be interpreted as the change in the outcome measure that is attributable to enrolling in the Compass FSS program. The findings from this analysis are reported in section 3.

of the recertification within the calendar month was different in the baseline recertification relative to the follow-up recertification.

3. Impact of Compass FSS on Earnings and Public Benefits Receipt

In our confirmatory analyses, we found that Compass FSS participants in the combined sample of Metro Housing, Cambridge, and Lynn PHAs had substantially higher earnings than their matched comparison group counterparts, both in the short term (as measured by the earliest annual recertification data 1 to 3 years following FSS enrollment), and the longer term (as measured by the most recent annual recertification available in the data, up through five years after enrollment). In exploratory results, we also found that Compass FSS participants had lower levels of public assistance receipt compared to their matched comparison group counterparts as well as a number of other impacts described below.

In this section, we report on the impacts of Compass FSS on earnings and benefits receipt for the full sample. We then report impacts on earnings and benefits receipt separately for Cambridge, Metro Housing, and Lynn.

Impacts of Compass for the Full Study Sample

Exhibit 3-1 presents the impacts of Compass FSS on the study's two confirmatory earnings outcomes as well as the impacts on additional exploratory measures of income for the full study sample (including treatment group households in Cambridge, Metro Housing and Lynn). For the two pre-specified confirmatory tests, we found:

- **Compass FSS participants had annual household earnings that were $4,997 (21 percent) higher (on average) than the earnings of the comparison group 1 to 3 years after FSS enrollment.**[17] [18] This reflects annual household earnings an average of 1.5 years after FSS enrollment.
- **Compass FSS participants had annual household earnings that were $6,032 (23 percent) higher (on average) than the earnings of the comparison group as measured by the most recent income certification that was no more than 5 years after FSS enrollment.** This reflects annual household earnings an average of 3.2 years after FSS enrollment.

Additional exploratory findings based on analysis of the full study sample include:

- **Compass FSS participants had less public assistance receipt than the comparison group.**
    - Compass FSS participants had annual public assistance receipt that was $447 (50 percent) lower (on average) than that of the comparison group 1 to 3 years after FSS enrollment.
    - Compass FSS participants had annual public assistance receipt that was $249 (39 percent) lower (on average) than that of the comparison group as measured by the most recent income certification that was no more than 5 years after FSS enrollment.

[17] As noted in section 2, prior to conducting matching we dropped potential comparison group households that participated in FSS. We conducted a sensitivity test to determine if this exclusion would have a sizable effect on the findings and determined that the findings are essentially similar whether or not we apply this sample restriction. If we were to keep comparison group households that enrolled in FSS in the pool of comparison group households considered for matching, the impact on earnings in the full sample measured 1 to 3 years after FSS enrollment would be $4,827 and the impact on most recent earnings would be $6,024. These impact estimates are only $170 less and $8 less than the corresponding impacts reported for our final analytic sample in Exhibit 3-1.

[18] Percent differences between Compass FSS participant and comparison household outcomes are calculated by dividing the average impact by the average comparison household outcome.

- **Compass FSS participants had a lower combined amount of SSI, Social Security, and pension income:**
    - Compass FSS participants had annual SSI, Social Security, and pension income that was $388 (15 percent) lower (on average) than that of the comparison group 1 to 3 years after FSS enrollment.
    - Compass FSS participants had annual SSI, Social Security, and pension income that was $565 (19 percent) lower (on average) than that of the comparison group as measured by the most recent income certification that was no more than 5 years after FSS enrollment.

  Our analysis did not separately examine the individual income sources within this broader income category.

- **Compass FSS participants had similar amounts of income from other sources relative to the comparison group.**
    - The differences in "other income" for Compass FSS participants and the comparison group were not statistically significant.

Exhibit 3-1. Impact of Compass FSS Program on Earnings and Public Benefits Receipt, Full Sample

Outcome	Average Years Between FSS Enrollment and Outcome Measurement	Impact[a]	Standard Error	*p*-Value	Average Outcome for Compass FSS Participant Households	Average Outcome for Matched Comparison Group Households
Earnings						
1 to 3 years after FSS enrollment	**1.5**	**$4,997****	**$780**	**0.000**	**$29,063**	**$24,065**
Most recent	**3.2**	**$6,032****	**$983**	**0.000**	**$32,197**	**$26,165**
Public Assistance						
1 to 3 years after FSS enrollment	1.5	-$447**	$82	0.000	$451	$898
Most recent	3.2	-$249**	$68	0.000	$383	$632
SSI, Social Security, and Pension Income						
1 to 3 years after FSS enrollment	1.5	-$388**	$143	0.007	$2,274	$2,661
Most recent	3.2	-$565**	$166	0.001	$2,367	$2,932
Other Income						
1 to 3 years after FSS enrollment	1.5	-$128	$219	0.560	$2,002	$2,130
Most recent	3.2	$290	$252	0.249	$2,286	$1,996

[a] The impact is computed as the difference in the *Average Outcome for Compass FSS Participant Households* and the *Average Outcome for Matched Comparison Group Households*. The impact can be interpreted as the change in outcome measure that is attributable to enrolling in the Compass FSS program.

NOTES: All reported dollar values are inflation-adjusted to 2020 dollars. Findings with a confirmatory level of evidence appear in bold. For all outcomes reported in this exhibit, the treatment group sample size is 564 and each treatment group household is matched to 3 comparison group households. Weights are used which result in an effective comparison group sample size that is equal to the treatment group sample size. For outcomes measured 1 to 3 years after FSS enrollment, treatment group outcomes are constructed using data from the first income certification that occurs 1 to 3 years after FSS enrollment and comparison group outcomes are constructed using data from the income certification that occurs closest in time to the income recertification used to construct the outcome for their treatment group match within the 1-to-3-year window. For most recent outcomes, treatment group outcomes are constructed using data from the most recent income certification that occurs 1 to 5 years after FSS enrollment and comparison group outcomes are constructed using data from the income certification that occurs closest in time to the income recertification used to construct the outcome for their treatment group match within the 1-to-5-year window. Public Assistance income includes TANF assistance, together with other general direct government assistance, and PHA-imputed TANF or direct assistance income. Other Income includes child support, medical reimbursement, Indian trusts receipt, Unemployment Insurance benefits, and income from other nonwage sources.

Statistical significance levels for two-sided tests are indicated with asterisks as follows: **= 1 percent; *= 5 percent.

To better understand the extent to which the observed impacts on earned income were driven by the heads of household or other family members, we separately estimated impacts of annual earned income for household heads only and determined the following:

- Compass FSS heads of households had annual household earnings that were $4,463 higher (on average) than the earnings of the comparison group heads of household 1 to 3 years after FSS enrollment.
- Compass FSS heads of household had annual household earnings that were $4,608 higher (on average) than the earnings of the comparison group heads of household as measured by the most recent income certification that was no more than 5 years after FSS enrollment.

This analysis suggests that most of the earnings gains attributable to Compass FSS were related to increases in annual earned income by the head of household, rather than other household members.[19]

See Appendix B for a more detailed description of these findings.

Subgroup Analysis: Impacts of Compass for Cambridge, Metro Housing, and Lynn

In addition to estimating impacts for the full study sample, we also estimated impacts separately for the subgroup of treatment group households in Cambridge, Metro Housing and Lynn. Given the smaller number of FSS participants in each individual agency (as compared with the full combined sample), this analysis is inherently exploratory. We found:

- **Compass FSS participants in each of the three housing agencies had higher annual household earnings than comparison group members 1 to 3 years after FSS enrollment**. (This reflects annual household earnings an average of 1.4 to 1.7 years after FSS enrollment). On average, the earnings of Compass FSS participants were:
    - $6,105 higher in Cambridge,
    - $5,929 higher in Metro Housing, and
    - $2,950 higher in Lynn

  than the earnings of their comparison group counterparts as measured 1 to 3 years after FSS enrollment.
- **Compass FSS participants in Cambridge and Metro Housing had higher annual household earnings than comparison group members as measured by the most recent income certification that was no more than 5 years after FSS enrollment.** (This reflects annual household earnings an average of 3.2 (Cambridge) and 2.7 (Metro Housing) years after FSS enrollment). On average, the earnings of Compass FSS participants were:
    - $8,141 higher in Cambridge and
    - $6,945 higher in Metro Housing

  than the earnings of their comparison group counterparts as measured by the most recent income recertification no more than 5 years after FSS enrollment.

[19] By contrast, Geyer et al. (2017) found that roughly half of the estimated impact of Compass FSS on household earnings was attributable to changes in earnings of heads of household, with the remaining impact attributable to other earners in the household. It is unclear why the prior and current reports found somewhat different findings on this point.

We did not detect a statistically significant impact on this measure of earnings for Lynn, where the relatively small number of treatment group households (143) limited our ability to detect impacts.

- **Compass FSS participants in each of the three housing agencies had less public assistance receipt than the comparison group in at least one time frame.**
    - Compass FSS participants in Metro Housing and Lynn had lower annual public assistance receipt than their comparison group counterparts as measured 1 to 3 years after FSS enrollment. The impact on public assistance receipt in this timeframe was -$522 in Metro Housing and -$922 in Lynn.
    - Compass FSS participants in all three agencies had annual public assistance receipt that was lower than the comparison group measure by the most recent income certification within 5 years of FSS enrollment. The impact on public assistance receipt in this timeframe was -$178 in Cambridge, -$215 in Metro Housing, and -$506 in Lynn.

See Appendix C for more information on the subgroup impact estimates for the FSS programs of the three individual PHAs.

4. Conclusion

As detailed in this report, we found that Compass FSS participants had higher earnings and lower public benefits receipt at follow-up than a matched comparison group. Compass FSS had a positive impact in both the short-term and long-term. Our results suggest that the Compass FSS program is an effective platform for helping participants in subsidized housing programs to make progress toward economic security, confirming findings established by Geyer et al. (2017).

Exploratory subgroup analyses of the outcomes for each of the three housing agencies suggest that the Compass FSS programs also had favorable impacts at the individual housing agency level. Of note for national policy discussions, we found positive impacts on both short- and long-term earnings for households who received Compass FSS through the Cambridge Housing Authority (CHA), where, at the time of the study, the FSS program provided escrow savings account contributions for households up to 50 percent of area median income that were only half those of the standard FSS model. This finding suggests that, at least in some implementations, an FSS program can be effective in supporting participants to increase earnings and financial self-sufficiency even without the full escrow savings amount.[20] [21]

Compass' FSS model and implementation may play an important role in the program's impacts

The substantial size of the estimated impacts in this and the previous quasi-experimental impact analysis of Compass FSS programs (Geyer et al. 2017), compared to other studies of FSS, also suggests that the model and delivery of the specific FSS program may play an important role in the program's effectiveness.

This evaluation did not include a qualitative assessment of Compass' implementation, but we know from other evaluative work Abt has completed for Compass that it exhibits a number of characteristics often associated with high-performing organizations that could contribute to the quality of its FSS program, including: (a) a learning culture – Compass regularly reviews data on the outcomes of its programs to determine whether it should be adjusting its approach; (b) a reliance on evidence-based practices – this is particularly evident in its use of participant-driven coaching and its adaptation of insights from behavioral economics to enhance its FSS marketing campaign; and (c) an emphasis on hiring quality staff, providing structured training and ongoing professional development, and the regular sharing and vetting of challenges among staff.

We note these points because the quality of a program's implementation is likely an important factor in determining its success. Our evaluation here is not of FSS generally, but of the FSS programs run by Compass in partnership with three specific housing agencies.

We are unable to separately determine the extent to which the results of this evaluation are driven by Compass' program model or its organizational culture and capacity. It is reasonable to assume the results reflect a combination of all of these factors. Future research should examine what program features and implementation approaches are (a) necessary, and (b) supportive for delivering a successful FSS program.

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[20] In addition, the escrow programs in both CHA and Metro Housing had eliminated the cap on escrow accumulation above 50 percent of area median income (AMI) and raised it to 80 percent of AMI, and Metro Housing has capped lifetime household escrow accumulation and disbursement at $25,000. However, it is not clear how to interpret any effects these policies may have had on the impacts of the current study.

[21] After the study period ended, CHA moved to contribute escrow at 100 percent of the standard escrow formula rate but retained the increased cap on escrow accruals at 80 percent of AMI rather than 50 percent.

In separate reports, we will explore the costs and benefits (for participants, service providers, and government) associated with the Compass FSS programs as implemented in Metro Housing and Cambridge, and the impacts of the Compass FSS program on families living in project-based Section 8 housing, a rental assistance program administered by private owners with funding from HUD.

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Appendix A: Selecting Comparison PHAs and Households

This appendix provides a detailed description of the methods used to select comparison PHAs and select comparison group households.

Selecting Comparison PHAs

To identify comparison PHAs, we first studied which cities and towns best resemble the census tracts in which housing assistance recipients in Metro Housing, CHA, and LHAND reside.[22] Geographic selection is important, because the employment opportunities and employment support opportunities such as public transportation and childcare options vary across cities. While it is impossible to fully control for the impact of place (e.g., local neighborhood amenities, local housing market, and regional job market) on Compass FSS participants, our approach at least ensures that the voucher holders included in the comparison sample live in census tracts comparable to those occupied by voucher holders in Metro Housing, Cambridge, and Lynn along observable dimensions.

For PHAs in Massachusetts, Connecticut, and Rhode Island, we evaluated the characteristics of the census tracts in which HCV households for each housing authority live using census tract characteristics from the 2010 U.S. Census. These characteristics are first weighted based on how many voucher households live in a census tract, and then standardized according to the means and standard deviations of these characteristics across all PHAs. Using these standardized characteristics, we generated a "distance" metric that allows us to compare the typical census tract of a voucher holder in one housing authority to the typical census tract of a voucher holder in another housing authority. The distance metric includes the following census tract variables:

- Percentage employed
- Average income
- Percentage of families below the poverty level
- Percentage Hispanic/Latino
- Percentage Black/African American
- Percentage age 65 and older
- Percentage single adult with child under age 18
- Percentage English spoken at home
- Number of people per square mile

[22] We excluded PHAs where more than 5 percent (as of 2015) of non-elderly households without a head or co-head with a disability were in an FSS program. Including only PHAs with relatively small FSS programs allows better modeling of comparison group members. In PHAs with large FSS programs (or FSS programs serving a relatively high percentage of the target population), many of the households who would otherwise be good candidates for the comparison group may be participating in another FSS program. Our analysis removes any households participating in FSS from the comparison group in order to estimate the absolute effects of the Compass FSS programs rather than the relative effects between the Compass FSS programs and other FSS programs. As reflected in a sensitivity analysis described in note 14, excluding individual households that participated in FSS from the pool of comparison households within the comparison PHAs did not have a sizable effect on the results of the analysis.

The distance metric allows us to compare housing authorities on several dimensions at the same time.[23] We selected the 20 most comparable PHA service areas separately for Metro Housing, Cambridge, and Lynn.

Selecting Comparison Group Households

The primary research question asks what effect the Compass FSS program has on households who participate in a Compass FSS program. To address this question, we require a process for selecting comparison group households who would sign up for Compass FSS if it were available to them and apart from living in non-treatment PHAs are otherwise similar to treatment group households. While treatment group households in our analytic sample enrolled in FSS as early as October 2010 and as late as October 2019, a challenge with identifying comparison group households is that we do not observe when comparison group households would have enrolled in FSS if it were offered to them. Therefore, it is not obvious which time period should be denoted as their baseline period (capturing their baseline characteristics prior to their would-be FSS enrollment date) and which time period should be used to capture outcomes after their would-be FSS enrollment date. To address this issue, we use a strategy called rolling entry matching.

As explained by Witman et al. (2019), rolling entry matching requires a "quasi-panel matching dataset" containing one observation per treatment group household and multiple observations for each potential comparison group household, one for each time their baseline characteristics are observed through an annual income recertification. Treatment group households baseline characteristics are observed once in the data, based on the last annual income recertification observed prior to FSS enrollment.[24] For potential comparison group households with multiple annual income recertifications, we create multiple observations for each household. For example, if a comparison group household has three annual income recertifications, we create three observations for that comparison group household, where each observation has baseline characteristics constructed from a different annual income recertification. This helps ensure that a match can be found for each treatment group household from the set of the potential comparison households who have a recertification within the same quarter as the treatment household's baseline recertification.

After constructing the quasi-panel matching dataset, we implemented a number of sample restrictions to arrive at the dataset we use for matching. We dropped comparison group households that were not located in one of the PHAs determined to be most comparable to Metro Housing Boston, Cambridge, or Lynn. We dropped comparison group households that participated in FSS. We dropped treatment group households that did not have an annual recertification in the two-year window prior to FSS enrollment. We dropped treatment and comparison group households if we do not observe post-baseline annual recertification that could be used to construct outcome data (more details on the construction of outcome data can be found below).

Our next step was to determine which baseline characteristics to use for matching. We selected the baseline characteristics to be used for matching using the Least Absolute Shrinkage and Selection

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[23] We standardize each measure for each PHA by subtracting the full sample mean and dividing by the full sample standard deviation. To construct the distance metric for Metro Housing, we compute the squared difference in each measure between Metro Housing and each potential comparison PHA. We determine each potential comparison PHAs distance from Metro Housing by summing together the squared difference across all measures. This provides an estimate of how "close" each PHA is to Metro Housing. We determine which PHAs are the best comparison for Metro Housing based on which have the lowest distance metric score. Similar steps were conducted for Cambridge and Lynn.

[24] In practice, baseline characteristics are observed for treatment group households 0 to 8 quarters prior to FSS enrollment.

Operator (LASSO) approach (Hastie, Tibshirani, and Wainwright 2015). LASSO regression is designed to improve prediction accuracy; in this analysis, it provided a strategy for selecting which measures are the most important predictors of FSS participation and earnings from a set of candidate measures.[25] We estimated the following two relationships using lasso regression: (1) for households in Metro Housing, Cambridge, and Lynn, we estimated the relationship between a set of baseline characteristics and participation in the Compass FSS program. (2) Using potential comparison group household observations, we estimated the relationship between a set of baseline characteristics and future earnings. Baseline characteristics that were selected by either of these two models are used to match treatment group households to comparison group households.[26]

We used Stata's *teffects nnmatch* command to conduct nearest neighbor matching. We conducted nearest neighbor matching based on the Mahalanobis distance, matching each treatment group household to 3 comparison group household observations with replacement. Each of the three comparison group household observations is given a weight of 1/3, which ensures that the effective comparison group sample size is equal to the treatment group sample size (given that we matched 3 comparison group observations to each treatment group household).

In addition to the baseline characteristics selected by the lasso regressions, we exact match on two key measures. First, we require an exact match for baseline quarter, which ensures that treatment group households and comparison group households have baseline measures constructed based on an annual recertification that occurs in the same quarter. For example, treatment group households whose baseline characteristics are observed in "Quarter 1 of 2012" are only able to be matched with potential comparison group observations whose baseline characteristics were also constructed based on data from "Quarter 1 of 2012" (and similarly for other quarters). Therefore, by construction, the baseline quarter of the comparison group household is determined based on the baseline quarter of their matched treatment group household. Second, we exact match on a categorical variable that captures whether the household is located in a PHA that is a comparison PHA for the specific PHA (Cambridge, Metro Housing, or Lynn) whose FSS program the household is in. This ensures that treatment households from Cambridge are only matched with comparison group households in one of the set of PHAs determined to be most comparable to Cambridge (and similarly for the treatment households from Metro Housing and Lynn).

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[25] LASSO regression minimizes the sum of squared errors (as is standard practice) but forces the sum of the absolute value of the regression coefficients to be less than a fixed value. In practice, this restriction forces the coefficients on baseline characteristics less correlated with the outcome of interest to be set equal to zero (and as a result, these characteristics are not used for matching).

[26] Selected continuous baseline characteristics include: Years in voucher program at baseline, Age of household head at baseline, Earnings amount at baseline, Welfare amount at baseline, Other income amount at baseline, and Social security amount at baseline. Selected binary baseline characteristics include: Number of children less than age 5 at baseline; Number of children age 5-18 at baseline; Number of adults in household at baseline; Household head disabled at baseline; Earnings $5,000 to $10,000 at baseline; Earnings $10,000 to $15,000 at baseline; Earnings $15,000 to $20,000 at baseline; Earnings $20,000 to $25,000 at baseline; Earnings $25,000 to $30,000 at baseline; Earnings $30,000 or more at baseline; and Received any welfare at baseline.

Appendix B: Sensitivity Analysis

Below, we include the results of two sensitivity analyses: (1) the impact on earnings and benefits receipt measured 3 to 5 years after FSS enrollment (an alternative time period to the outcomes reported in the body of the report) and (2) the impact on earnings for household heads (an alternative to reporting impacts for all eligible household members). The first sensitivity analysis represents another somewhat similar outcome to the ones we measured; a positive finding on this analysis would add to the robustness of our primary findings. The second sensitivity analysis allows us to better understand whether and to what extent the observed impacts are related to earnings growth among household heads, as opposed to other family members.

Outcomes Three to Five Years Following Enrollment

In consultation with Compass, prior to conducting the impact analyses we decided to construct two versions of each outcome that would be the focus of the main report: the outcome measured 1 to 3 years after FSS enrollment and the most recent measure of the outcome that was no more than 5 years after FSS enrollment. Outcomes measured 1 to 3 years after FSS enrollment reflect outcomes an average of 1.5 years after FSS enrollment and enable us to capture short-term impacts of Compass FSS. Most recent outcomes reflect outcomes an average of 3.2 years after FSS enrollment and enable us to capture long-term impacts of Compass FSS.

As a sensitivity check, we also constructed an outcome that captures study participants experiences 3 to 5 years after FSS enrollment. These outcomes have lower sample sizes than the measures reported in the main text because some households that had an annual recertification 1 to 3 years after FSS enrollment did not have an annual recertification 3 to 5 years after FSS enrollment. Exhibit B-1 reports impacts on outcomes measured 3 to 5 years after FSS enrollment. Compass FSS participants had annual household earnings that were $6,155 higher (on average) than the earnings of the comparison group 3 to 5 years after FSS enrollment. This reflects annual household earnings an average of 3.5 years after FSS enrollment. We do not detect an impact on other outcomes measured 3 to 5 years after FSS enrollment.

Exhibit B-1. Impact of Compass FSS Program on Earnings and Public Benefits Receipt Measured 3 to 5 Years After FSS Enrollment

Outcome	Average Years Between FSS Enrollment and Outcome Measurement	Impact[a]	Standard Error	*p*-Value	Average Outcome for Compass FSS Participant Households	Average Outcome for Matched Comparison Group Households
Earnings						
3 to 5 years after FSS enrollment	3.5	$6,155**	$1,248	0.000	$29,963	$23,808
Public Assistance						
3 to 5 years after FSS enrollment	3.5	-$152	$114	0.182	$568	$719
SSI, Social Security, and Pension Income						
3 to 5 years after FSS enrollment	3.5	-$359	$234	0.125	$2,332	$2,692
Other Income						
3 to 5 years after FSS enrollment	3.5	$448	$347	0.197	$2,406	$1,959

[a] The impact is computed as the difference in the *Average Outcome for Compass FSS Participant Households* and the *Average Outcome for Matched Comparison Group Households*. The impact can be interpreted as the change in outcome measure that is attributable to enrolling in the Compass FSS program.

NOTES: All reported dollar values are inflation-adjusted to 2020 dollars. For all outcomes reported in this exhibit, the treatment group sample size is 320 and each treatment group household is matched to 3 comparison group households. Weights are used which result in an effective comparison group sample size that is equal to the treatment group sample size. For outcomes measured 3 to 5 years after FSS enrollment, treatment group outcomes are constructed using data from the first income certification that occurs 3 to 5 years after FSS enrollment and comparison group outcomes are constructed using data from the income certification that occurs closest in time to the income recertification used to construct the outcome for their treatment group match within the 3-to-5-year window.

Public Assistance income includes TANF assistance, together with other general direct government assistance, and PHA-imputed TANF or direct assistance income. Other Income includes child support, medical reimbursement, Indian trusts receipt, Unemployment Insurance benefits, and income from other nonwage sources.
Statistical significance levels for two-sided tests are indicated with asterisks as follows: **= 1 percent; *= 5 percent.

This sensitivity analysis confirms that the earnings impacts reported in the main analysis are robust to different ways of measuring them. There are a number of potential explanations for why we would find significant reductions in the receipt of public benefits in the main analyses, but not in this sensitivity analysis. One possibility is that the impacts are not large enough be detectable with the smaller sample size of this sensitivity analysis, which is about 57 percent the size of the full sample. A second possibility is that households experience a short-term reduction in public assistance that disappears over time – for example, both the comparison group and FSS households may lose TANF income over time due to Massachusetts' time limits. A third possibility is that households that experience sizable reductions in public benefits leave subsidized housing and are no longer present in the long-term analysis.

The Role of Head of Household Earnings

The outcomes reported in the body of this report capture earnings and benefits receipt for the entire household, which includes the head of household (who is usually the primary FSS participant) and other adult members of the household who are included on the lease. Because the membership of a household can change over time, to add or remove participants, we felt it important to assess whether changes in household membership might explain the impacts we observed. Accordingly, we also estimated impacts on the earnings of the household head alone (excluding earnings outcomes from non-head household members). As reported in Exhibit B-2, we found:

- Compass FSS heads of households had annual household earnings that were $4,463 higher (on average) than the earnings of the comparison group heads of household 1 to 3 years after FSS enrollment. This implies that 89 percent of the $4,997 average gain in earnings for the entire household is due to earnings gains for the household head.
- Compass FSS heads of household had annual household earnings that were $4,608 higher (on average) than the earnings of the comparison group heads of household as measured by the most recent income certification that was no more than 5 years after FSS enrollment. This implies that 76 percent of the $6,032 average gain in earnings for the entire household is due to earnings gains for the household head.

This suggests that most of the earnings gains are experienced by the head of household. In Geyer et al. (2017), we similarly found that the household's earnings gains reflected a combination of gains from the head of household and other household members. In that study, we found that about half of the household earnings gains were attributable to the head of the household, a somewhat lower percentage than found here. Based on the ages of household members with increased income, we determined in that earlier study

that most of the earnings increases not attributable to the head of household were likely attributable to adult children of the household head.

Exhibit B-2. Impact of Compass FSS Program on Earnings of Household Head, Full Sample

Outcome	Average Years Between FSS Enrollment and Outcome Measurement	Impact[a]	Standard Error	*p*-Value	Average Outcome for Compass FSS Participant Households	Average Outcome for Matched Comparison Group Households
Earnings of Household Head						
1 to 3 years after FSS enrollment	1.5	$4,463**	$711	0.000	$24,339	$19,876
Most recent	3.2	$4,608**	$824	0.000	$25,964	$21,356
Earnings of Household (as reported in Exhibit 3-1)						
1 to 3 years after FSS enrollment	**1.5**	**$4,997****	**$780**	**0.000**	**$29,063**	**$24,065**
Most recent	**3.2**	**$6,032****	**$983**	**0.000**	**$32,197**	**$26,165**

The impact is computed as the difference in the *Average Outcome for Compass FSS Participant Households* and the *Average Outcome for Matched Comparison Group Households*. The impact can be interpreted as the change in outcome measure that is attributable to enrolling in the Compass FSS program.

NOTES: All reported dollar values are inflation-adjusted to 2020 dollars. Findings with a confirmatory level of evidence appear in bold. For all outcomes reported in this exhibit, the treatment group sample size is 564 and each treatment group household is matched to 3 comparison group households. Weights are used which result in an effective comparison group sample size that is equal to the treatment group sample size. For outcomes measured 1 to 3 years after FSS enrollment, treatment group outcomes are constructed using data from the first income certification that occurs 1 to 3 years after FSS enrollment and comparison group outcomes are constructed using data from the income certification that occurs closest in time to the income recertification used to construct the outcome for their treatment group match within the 1-to-3-year window. For most recent outcomes, treatment group outcomes are constructed using data from the most recent income certification that occurs 1 to 5 years after FSS enrollment and comparison group outcomes are constructed using data from the income certification that occurs closest in time to the income recertification used to construct the outcome for their treatment group match within the 1-to-5-year window. Public Assistance income includes TANF assistance, together with other general direct government assistance, and PHA-imputed TANF or direct assistance income. Other Income includes child support, medical reimbursement, Indian trusts receipt, Unemployment Insurance benefits, and income from other nonwage sources.

Statistical significance levels for two-sided tests are indicated with asterisks as follows: **= 1 percent; *= 5 percent.

Appendix C: Subgroup Analysis

Below, we include the full results of the exploratory analyses we conducted of impacts at the PHA level for Cambridge, Metro Housing, and Lynn (Exhibits C-1, C-2, and C-3).[27]

Exhibit C-1. Impact of Compass FSS Program on Earnings and Public Benefits Receipt, Cambridge Housing Authority

Outcome	Average Years Between FSS Enrollment and Outcome Measurement	Impact[a]	Standard Error	*p*-Value	Average Outcome for Compass FSS Participant Households	Average Outcome for Matched Comparison Group Households
Earnings						
1 to 3 years after FSS enrollment	1.5	$5,929**	$1,241	0.000	$29,845	$23,916
Most recent	3.2	$8,141**	$1,572	0.000	$35,034	$26,893
Public Assistance						
1 to 3 years after FSS enrollment	1.5	-$84	$126	0.506	$500	$583
Most recent	3.2	-$178**	$66	0.007	$207	$385
SSI, Social Security, and Pension Income						
1 to 3 years after FSS enrollment	1.5	-$493*	$204	0.016	$2,340	$2,834
Most recent	3.2	-$834**	$274	0.002	$2,461	$3,295
Other Income						
1 to 3 years after FSS enrollment	1.5	-$503	$332	0.130	$1,855	$2,358
Most recent	3.2	$202	$419	0.630	$2,120	$1,918

[a] The impact is computed as the difference in the *Average Outcome for Compass FSS Participant Households* and the *Average Outcome for Matched Comparison Group Households*. The impact can be interpreted as the change in outcome measure that is attributable to enrolling in the Compass FSS program.

NOTES: For all outcomes reported in this exhibit, the treatment group sample size is 230 and each treatment group household is matched to 3 comparison group households. Weights are used which result in an effective comparison group sample size that is equal to the treatment group sample size.
Statistical significance levels for two-sided tests are indicated with asterisks as follows: **= 1 percent; *= 5 percent.

[27] The following notes apply uniformly to all three exhibits (C-1, C-2, and C-3): All reported dollar values are inflation-adjusted to 2020 dollars. Weights are used which result in an effective comparison group sample size that is equal to the treatment group sample size. For outcomes measured 1 to 3 years after FSS enrollment, treatment group outcomes are constructed using data from the first income certification that occurs 1 to 3 years after FSS enrollment and comparison group outcomes are constructed using data from the income certification that occurs closest in time to the income recertification used to construct the outcome for their treatment group match within the 1-to-3-year window. For most recent outcomes, treatment group outcomes are constructed using data from the most recent income certification that occurs 1 to 5 years after FSS enrollment and comparison group outcomes are constructed using data from the income certification that occurs closest in time to the income recertification used to construct the outcome for their treatment group match within the 1-to-5-year window. Public Assistance income includes TANF assistance, together with other general direct government assistance, and PHA-imputed TANF or direct assistance income. Other Income includes child support, medical reimbursement, Indian trusts receipt, Unemployment Insurance benefits, and income from other nonwage sources.

Exhibit C-2. Impact of Compass FSS Program on Earnings and Public Benefits Receipt, Metro Housing|Boston

Outcome	Average Years Between FSS Enrollment and Outcome Measurement	Impact[a]	Standard Error	*p*-Value	Average Outcome for Compass FSS Participant Households	Average Outcome for Matched Comparison Group Households
Earnings						
1 to 3 years after FSS enrollment	1.7	$6,105**	$1,434	0.000	$31,411	$25,306
Most recent	2.7	$6,945**	$1,672	0.000	$32,867	$25,922
Public Assistance						
1 to 3 years after FSS enrollment	1.7	-$522**	$116	0.000	$311	$833
Most recent	2.7	-$215*	$104	0.038	$461	$677
SSI, Social Security, and Pension Income						
1 to 3 years after FSS enrollment	1.7	-$656*	$289	0.023	$2,297	$2,954
Most recent	2.7	-$683*	$266	0.010	$2,259	$2,942
Other Income						
1 to 3 years after FSS enrollment	1.7	$957*	$419	0.022	$2,408	$1,452
Most recent	2.7	$1,141*	$451	0.011	$2,816	$1,675

[a] The impact is computed as the difference in the *Average Outcome for Compass FSS Participant Households* and the *Average Outcome for Matched Comparison Group Households*. The impact can be interpreted as the change in outcome measure that is attributable to enrolling in the Compass FSS program.

NOTES: For all outcomes reported in this exhibit, the treatment group sample size is 191 and each treatment group household is matched to 3 comparison group households. Weights are used which result in an effective comparison group sample size that is equal to the treatment group sample size.
Statistical significance levels for two-sided tests are indicated with asterisks as follows: **= 1 percent; *= 5 percent.

Exhibit C-3. Impact of Compass FSS Program on Earnings and Public Benefits Receipt, Lynn Housing Authority

Outcome	Average Years Between FSS Enrollment and Outcome Measurement	Impact[a]	Standard Error	*p*-Value	Average Outcome for Compass FSS Participant Households	Average Outcome for Matched Comparison Group Households
Earnings						
1 to 3 years after FSS enrollment	1.4	$2,950*	$1,362	0.030	$24,667	$21,716
Most recent	3.7	$2,086	$1,857	0.261	$26,739	$24,654
Public Assistance						
1 to 3 years after FSS enrollment	1.4	-$922**	$183	0.000	$561	$1,483
Most recent	3.7	-$506*	$203	0.012	$561	$1,067
SSI, Social Security, and Pension Income						
1 to 3 years after FSS enrollment	1.4	$87	$253	0.730	$2,136	$2,049
Most recent	3.7	-$111	$321	0.729	$2,360	$2,471
Other Income						
1 to 3 years after FSS enrollment	1.4	-$908*	$416	0.029	$1,695	$2,603
Most recent	3.7	-$424	$429	0.323	$1,845	$2,268

[a] The impact is computed as the difference in the *Average Outcome for Compass FSS Participant Households* and the *Average Outcome for Matched Comparison Group Households*. The impact can be interpreted as the change in outcome measure that is attributable to enrolling in the Compass FSS program.

NOTES: For all outcomes reported in this exhibit, the treatment group sample size is 143 and each treatment group household is matched to 3 comparison group households. Weights are used which result in an effective comparison group sample size that is equal to the treatment group sample size.
Statistical significance levels for two-sided tests are indicated with asterisks as follows: **= 1 percent; *= 5 percent.